3.5/5) $F(x) = f(g(x))$

so $F'(x) = f'(g(x)) \cdot g'(x)$

$F'(3) = f'(g(3)) \cdot g'(3)$

$= f'(5) \cdot 7$

$= (-1)(7) = -7$

b) $G(x) = g(f(x))$

$G'(x) = g'(f(x)) \cdot f'(x)$

so $G'(3) = g'(f(3)) \cdot f'(3)$

$= g'(5) \cdot (-2)$

$= (4)(-2) = -8$

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3.5/21 $f(x) = 2\sec^2(x^7)$ $\left(\sec(x^7)\right)^2$

$x \mapsto x^7 \mapsto \sec x \mapsto x^2$

$$f'(x) = 2\left[2\left(\sec(x^7)\right)\frac{d}{dx}\left(\sec(x^7)\right)\right]$$

$$= 4\sec(x^7)\left[\sec(x^7)\tan(x^7)\frac{d}{dx}(x^7)\right]$$

$$= 4\sec^2(x^7)\tan(x^7)(7x^6)$$

$$= 28x^6\sec^2(x^7)\tan(x^7)$$

$[f(g(x))]' = f'(g(x)) \cdot g'(x)$

$\left(\sec(x^7) \right)^2$

$f' = 2\left(\sec(x^7) \right)' \cdot \frac{d}{dx}\left(\sec(x^7) \right)$

$= 2(\sec(x^7)) \cdot \left[\sec(x^7)\tan(x^7) \frac{d}{dx}\boxed{(x^7)} \right]$

$= 2\sec(x^7)\sec(x^7)\tan(x^7)(7x^6)\frac{d}{dx}(x)$

3.5
15

$f(x) = \sin(x^3)$

$\underbrace{x \mapsto x^3 \mapsto \sin x}$

$\sin(x^3)$

$[f(g)]' = f'(g(x)) \cdot g'(x)$

$f(x) = \sin(x)$

$g(x) = x^3$

$f'(x) = \cos(x^3)\frac{d}{dx}(x^3)$

$= \cos(x^3)(3x^2) = 3x^2\cos(x^3)$

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3.5 11)

$$f(x) = \frac{4}{(3x^2-2x+1)^3} = 4(3x^2-2x+1)^{-3}$$

$$f'(x) = 4\left(-3(3x^2-2x+1)^{-4}\right)(6x-2)$$

$$= -24(3x-1)(3x^2-2x+1)^{-4}$$

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$$f(x)=\frac{4}{(3x^2-2x+1)^3}$$

$$\frac{d}{dx}\left(\frac{f}{g}\right)=\frac{f'g-fg'}{g^2}$$

$$f'(x)=\frac{0(3x^2-2x+1)^3-4\left(3(3x^2-2x+1)^2(6x-2)\right)}{(3x^2-2x+1)^6}$$

3.5/17 M

$$f(x) = 4\cos^5 x = 4\left[\cos(x)\right]^5$$

$$f'(x) = 4\left(5\left[\cos(x)\right]^4\left(-\sin(x)\right)\right)$$

3.5/12) $f(x) = \sqrt{x^3-2x+5} = (x^3-2x+5)^{\frac{1}{2}}$

$$f'(x) = \frac{1}{2}(x^3-2x+5)^{\frac{1}{2}-1}(3x^2-2)$$

$\frac{d}{dx}$

$$= \frac{3x^2-2}{2\sqrt{x^3-2x+5}}$$

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3.5/22)

$$f(x) = \cos^3\left(\frac{x}{x+1}\right) = \left[\cos\left(\frac{x}{x+1}\right)\right]^3$$

$$f'(x) = 3\left[\cos\left(\frac{x}{x+1}\right)\right]^2 \frac{d}{dx}\left(\cos\left(\frac{x}{x+1}\right)\right)$$

$$= 3\left[\cos\left(\frac{x}{x+1}\right)\right]^2\left(-\sin\left(\frac{x}{x+1}\right)\right)\left(\frac{d}{dx}\left(\frac{x}{x+1}\right)\right)$$

$$= -3\cos^2\left(\frac{x}{x+1}\right)\sin\left(\frac{x}{x+1}\right)\left[\frac{(1)(x+1)-(x)(1)}{(x+1)^2}\right]$$

$$= -3\sin\left(\frac{x}{x+1}\right)\cos^2\left(\frac{x}{x+1}\right)\frac{1}{(x+1)^2}$$

notice $\frac{x}{x+1} = x(x+1)^{-1}$

$$\frac{x}{x+1} = \frac{x+1-1}{x+1} = \left(\frac{x+1}{x+1}\right) - \left(\frac{1}{x+1}\right)$$

$$= 1 - (x+1)^{-1}$$